

TISSUE CULTURE AND PROTOPLASTS
OF
TWO RARE ARACEAE (AROID)
PLANTS

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CERTIFICATE

I certify that this thesis has not already been submitted for any degree, and is not being submitted as part of candidature for any other degree.

I also certify that the thesis has been written by me and that any help that I have received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

Signature of Candidate

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SUMMARY

As a major family of tropical rainforest plants, *Araceae* or Aroids are not only of horticultural importance, but also have some agricultural significance in the eastern tropics and subtropics. On the other hand, many species are rare and endangered, and the need for conserving them from extinction is urgent. However, details of their propagation in general is hampered by the slow rate of vegetative multiplication. This project therefore describes studies on the *in vitro* micropropagation of *Alocasia lauterbachiana* Engler and *Homalomena davidiana* A. Hay, as a beginning to more detailed studies on the propagation of Aroid in general.

Protoplasts were successfully isolated. The best digestion enzyme combination was 2% cellulysin (from *Trichoderma viride*), plus 1% cellulase (from *Aspergillus niger*) and 1% cellulase (from *Penicillium funiculosum*). A period of 4-5 hours of incubation time produced a maximum number of isolated protoplasts at 25°C.

A successful protocol for the rapid micropropagation of both Aroid species was developed, which combined callus induction and a high rate of shoot multiplication, followed by root development. Plantlets could then be directly transferred to green house acclimatization conditions, with high survival rates.

The effects of different explant sources, various auxins and cytokinins, and basal media on callus and shoot initiation were determined. Half strength Murashige and Skoog media was superior to full strength and quarter strength media. The best plant growth regulator and concentration was 5.0 µM thidiazuron for continued callus induction, and 2.5 µM thidiazuron for continued callus growth. Root development was best achieved by 0.25 µM naphthalene acetic acid.

The present study therefore introduced a tissue culture method aimed at preserving cell lines and tissues derived from differentiated callus and shoots, which should aid in the preservation of these two rare Aroid species; of which one (*Alocasia lauterbachiana*) is also endangered.

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ABBREVIATIONS

BA(BAP)	benzyladenine: benzylaminopurine
BME	β -mercapto-ethanol
BSA	bovine serum albumen
2,4-D	2,4-dichlorophenoxyacetic acid
FW	fresh weight
g	gram
GA	gibberellic acid
IAA	1H-indole-3-acetic acid
IBA	indole-3-butyric acid
K	kinetin; N ⁶ - furfuryl adenine
kPa	kilopascal
NAA	α -naphthaleneacetic acid
MES	2-(N-morpholino) ethanesulfonic acid
MS	Murashige and Skoog
MW	molecular weight
PAR	photosynthetic active radiation
PGR	plant growth regulators
PVP	polyvinyl-pyrrolidone
RPM	revolutions per minute
SE	standard error
SEM	scanning electron microscopy
TC	tissue culture
TEM	transmission electron microscopy
TDZ	thidiazuron
UV	ultraviolet light
WPM	woody plant medium
V/V	percent "volume in volume"
W/V	percent "weight in volume"
Z	zeatin; 2-methyl-4-(1H-purin-6-ylamino)-2-buten-1-ol

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